

Claims

1. A delivery system for pharmaceutical agents wherein said system comprises liposomes which comprise in their internal compartment a pharmaceutical agent and which have linked to their external surface the cell adhesion molecule NCAM or a fragment thereof.

2. The delivery system of claim 1, wherein said NCAM fragment comprises IG loop domains I, II and III.

3. The delivery system according to claim 1 or 2, wherein said cell adhesion molecule is linked to said external surface of said liposomes via a transmembrane domain or a hydrophobic anchor molecule.

4. The delivery system according to anyone of the preceding claims, wherein said pharmaceutical agent is selected from the group consisting of DNA, RNA, oligonucleotides, polypeptides, peptides, antineoplastic agents, hormones, vitamins, enzymes, antivirals, antibiotics, antiinflammatories, antiprotozoans, antirheumatics, radioactive compounds, antibodies, prodrugs, and combinations thereof.

5. The delivery system according to claim 4, wherein said pharmaceutical agent is a DNA, preferably a cDNA which is operably linked to a gene expression construct.

6. The delivery system according to claim 5, wherein said cDNA encodes a functional protein.

7. The delivery system according to claim 6, wherein said functional protein is the human dystrophin protein.

8. The delivery system according to anyone of claims 5 to 6, wherein said delivery system comprises a DNA compacting agent.

9. The delivery system according to claim 8, wherein said DNA compacting agent is a reversibly cross-linkable cation.

10. The delivery system according to claim 9, wherein said reversible cross-link is a thio bridge.

11. The delivery system according to anyone of claims 5-10, wherein said delivery system comprises a 5 chemical inclusion and/or a biological inclusion for the breaching of the endosomal barrier.

12. The delivery system according to anyone of claims 5-11, wherein said delivery system comprises a nuclear localisation signal, preferably in the form of 10 PNA linked peptides or PNA linked ligands.

13. The delivery system according to anyone of claims 5-12, wherein said delivery system comprises an anti-apoptotic activity.

14. The delivery system according to claim 15 13, wherein said anti-apoptotic activity is selected from the group consisting of Bcl-2, a small interfering RNA directed against Bax, a peptide comprising caspase inhibitor sequences, preferably Bcl XL..

15. The delivery system according to claims 4 20 to 14, wherein said delivery system comprises a DNA integrase activity or a molecule encoding such a DNA integrase activity.

16. The delivery system according to claim 15, wherein said integrase is the integrase of phi C31 25 bacteriophage.

17. A pharmaceutical composition comprising a delivery system according to claims 1 to 16.